Five.I Complex Vector Spaces

Linear Algebra

Jim Hefferon

http://joshua.smcvt.edu/linearalgebra

Chapter Five. Similarity

This chapter requires that we factor polynomials but many polynomials do not factor over the real numbers. For instance, $x^2 + 1$ does not factor into a product of two linear polynomials with real coefficients; instead it requires complex numbers $x^2 + 1 = (x - i)(x + i)$.

Consequently in this chapter we shall use complex numbers for our scalars, including entries in vectors and matrices. That is, we shift from studying vector spaces over the real numbers to vector spaces over the complex numbers. Any real number is a complex number and in this chapter most of the examples use only real numbers but nonetheless, the critical theorems require that the scalars be complex. So this first section is a review of complex numbers.

Review of Factoring and Complex Numbers